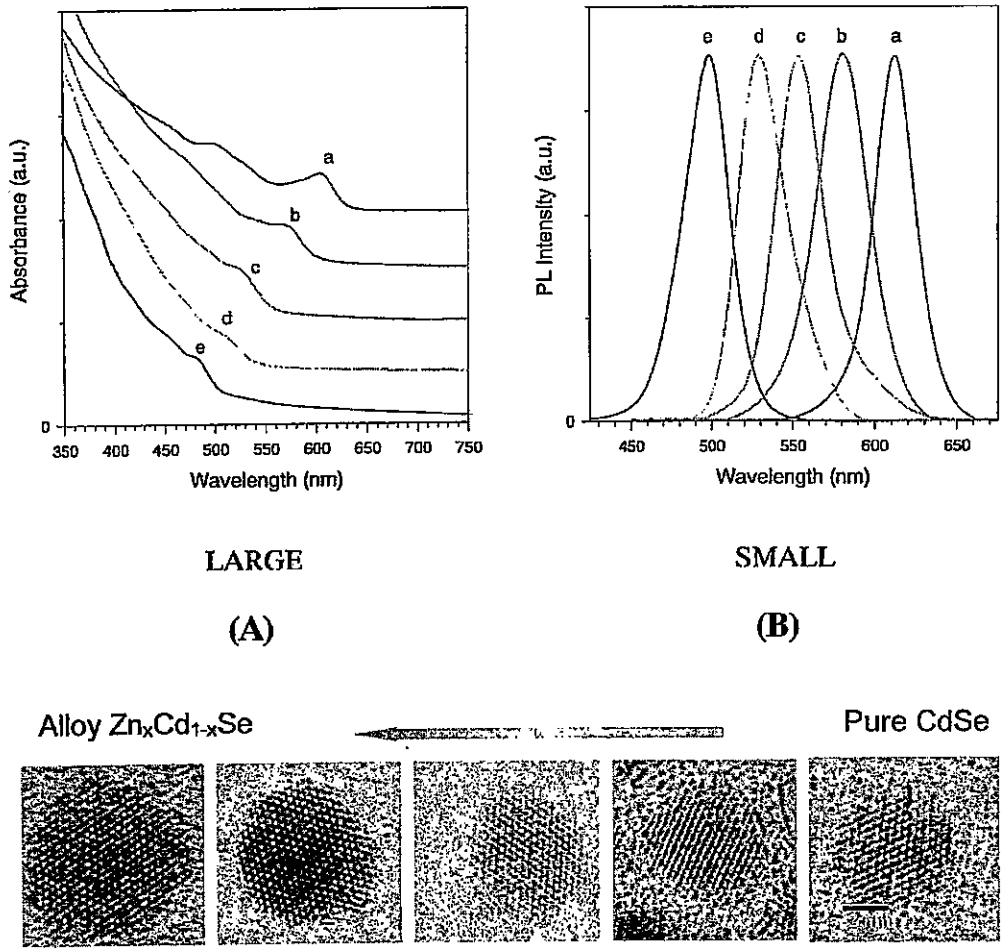

Absorbance (a.u.)
0
350 400 450 500 550 600 650 700 750
Wavelength (nm)
a
b
c
d
e
PL Intensity (a.u.)
0
450 500 550 600 650
Wavelength (nm)
e d c b a
LARGE
SMALL
(A)
(B)
Alloy $Zn_xCd_{1-x}Se$
Pure CdSe
(C)

Figure 1

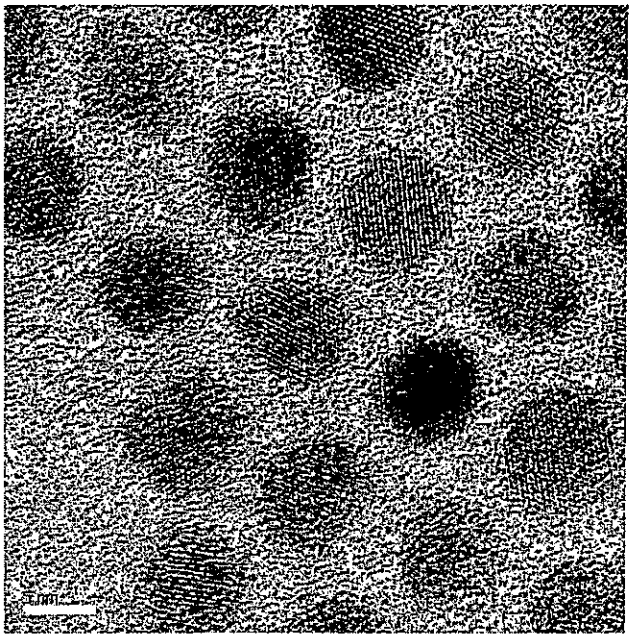


Figure 2

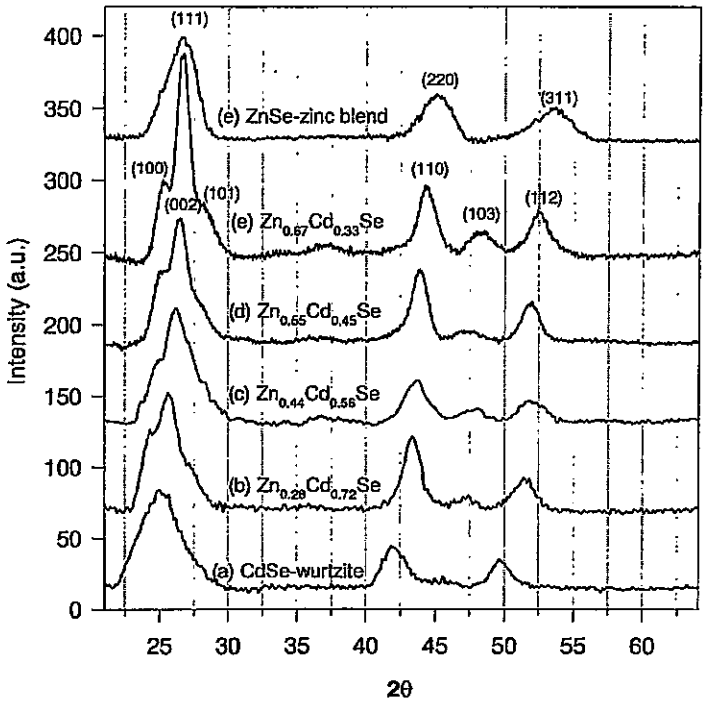

(111)
(220)
(311)
(e) ZnSe-zinc blend
(100)
(002)
(101)
(110)
(103)
(112)
(e) $Zn_{0.67}Cd_{0.33}Se$
(d) $Zn_{0.55}Cd_{0.45}Se$
(c) $Zn_{0.44}Cd_{0.56}Se$
(b) $Zn_{0.28}Cd_{0.72}Se$
(a) CdSe-wurtzite
Intensity (a.u.)
2θ
0
50
100
150
200
250
300
350
400
25
30
35
40
45
50
55
60

Figure 3

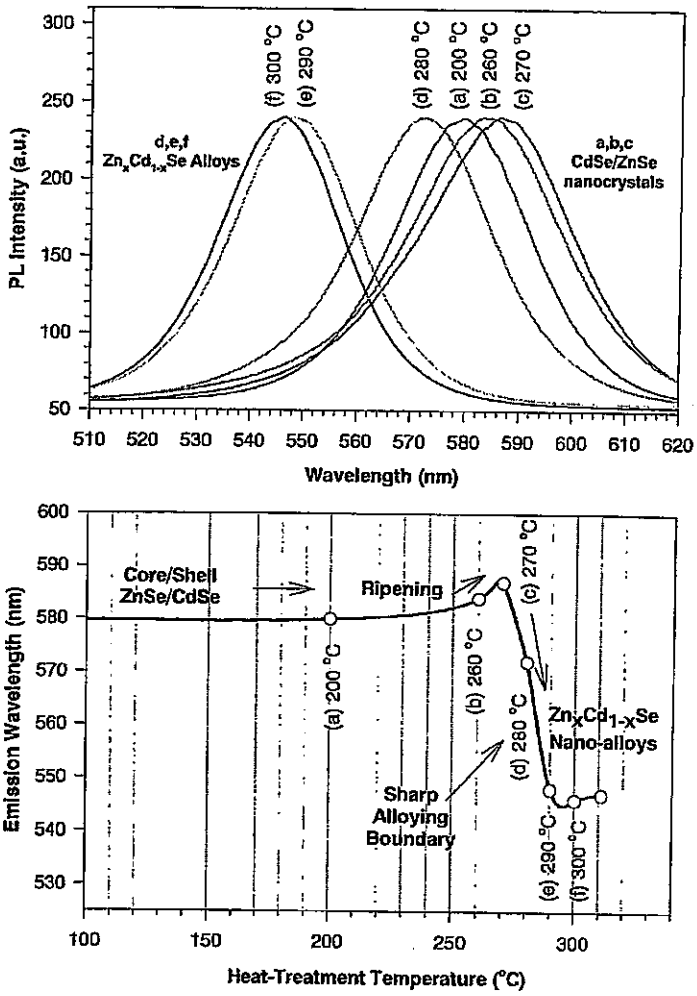

PL Intensity (a.u.)
Wavelength (nm)
(f) 300 °C
(e) 290 °C
(d) 280 °C
(a) 200 °C
(b) 260 °C
(c) 270 °C
d,e,f
Zn$_x$Cd$_{1-x}$Se Alloys
a,b,c
CdSe/ZnSe
nanocrystals
(A)
Emission Wavelength (nm)
Heat-Treatment Temperature (°C)
Core/Shell
ZnSe/CdSe
Ripening
Sharp
Alloying
Boundary
Zn$_x$Cd$_{1-x}$Se
Nano-alloys
(B)

Figure 4

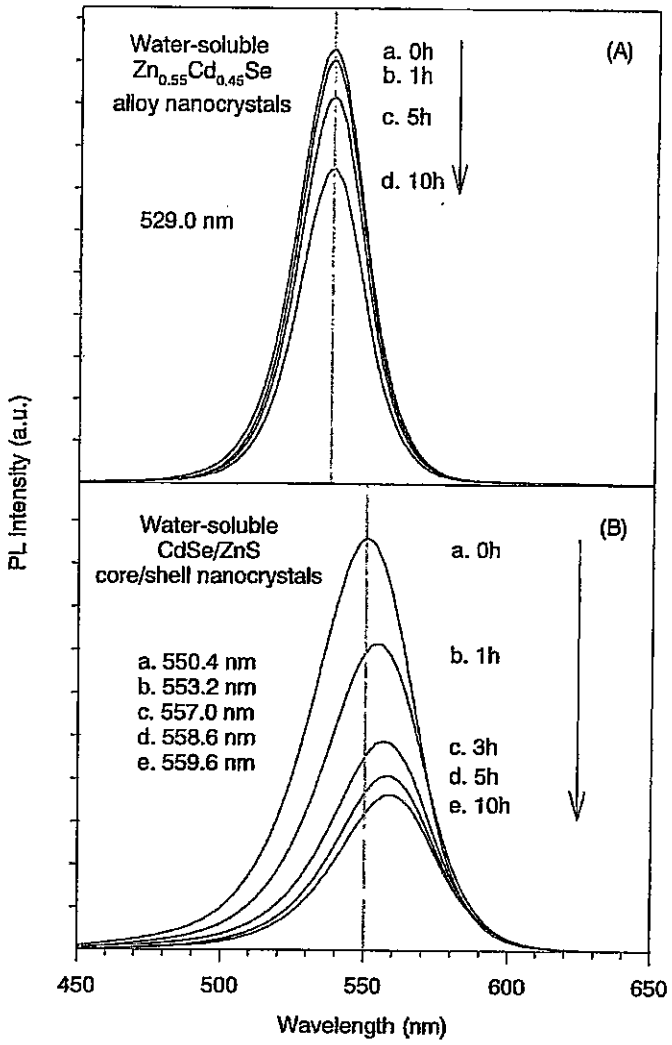

Water-soluble
$Zn_{0.55}Cd_{0.45}Se$
alloy nanocrystals
529.0 nm
a. 0h
b. 1h
c. 5h
d. 10h
(A)
Water-soluble
CdSe/ZnS
core/shell nanocrystals
a. 550.4 nm
b. 553.2 nm
c. 557.0 nm
d. 558.6 nm
e. 559.6 nm
a. 0h
b. 1h
c. 3h
d. 5h
e. 10h
(B)
PL Intensity (a.u.)
450
500
550
600
650
Wavelength (nm)

Figure 5

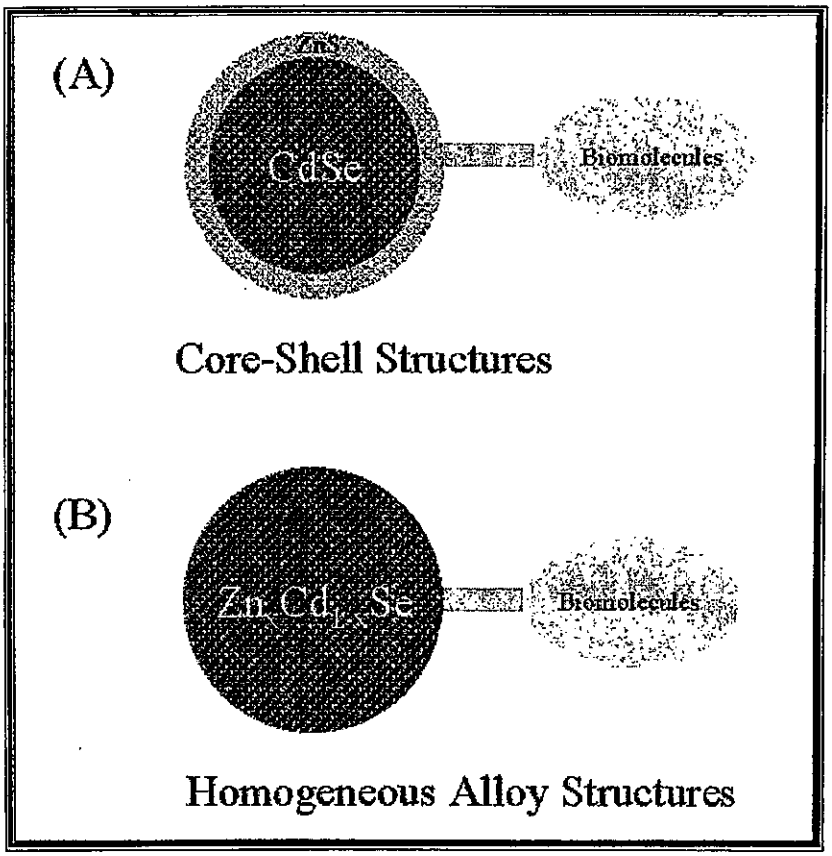
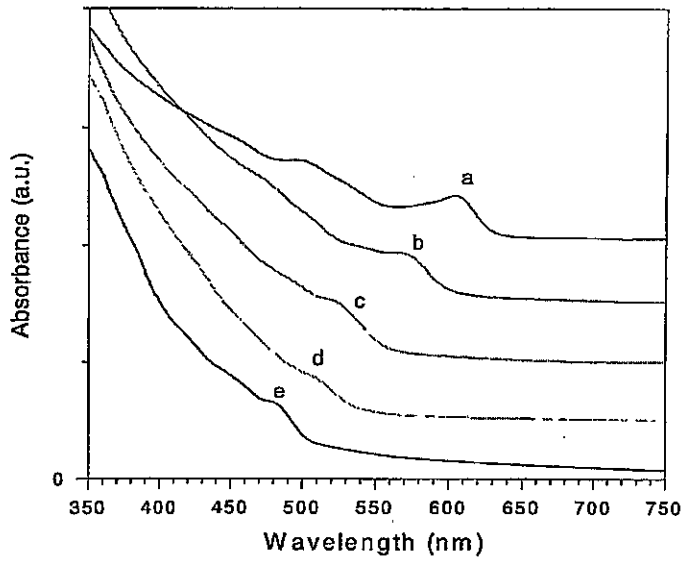
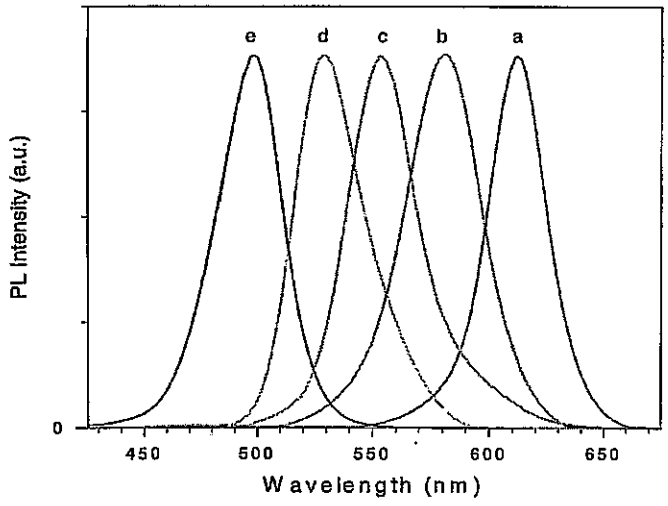

(A)
ZnS
CdSe
Biomolecules
Core-Shell Structures
(B)
Zn Cd Se
Biomolecules
Homogeneous Alloy Structures

Figure 6

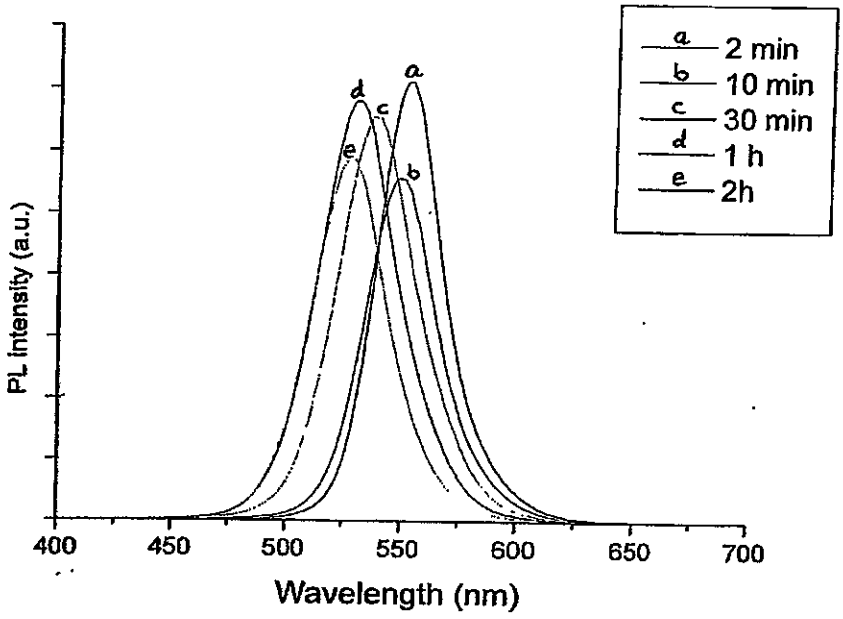

Absorbance (a.u.)
0
350
400
450
500
550
600
650
700
750
Wavelength (nm)
a
b
c
d
e

(A)

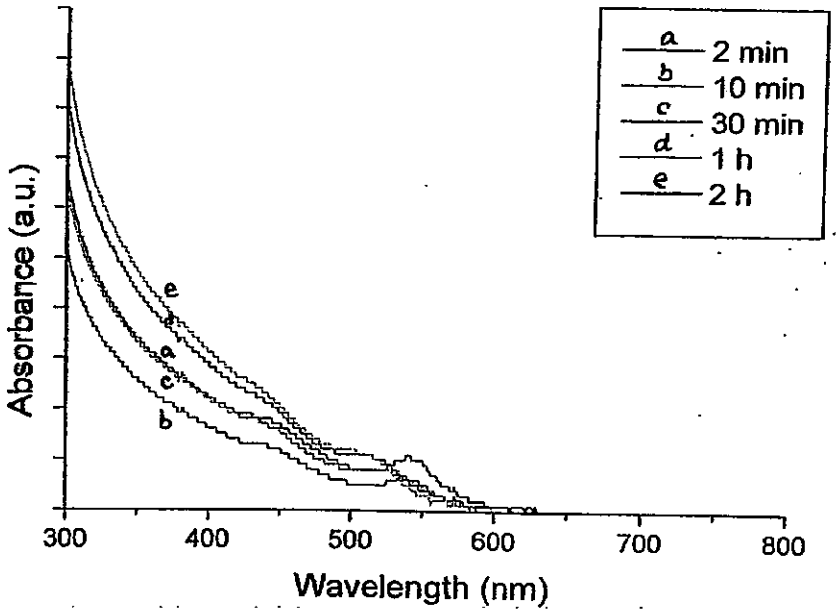

PL Intensity (a.u.)
0
450
500
550
600
650
Wavelength (nm)
e
d
c
b
a

(B)

Figure 7

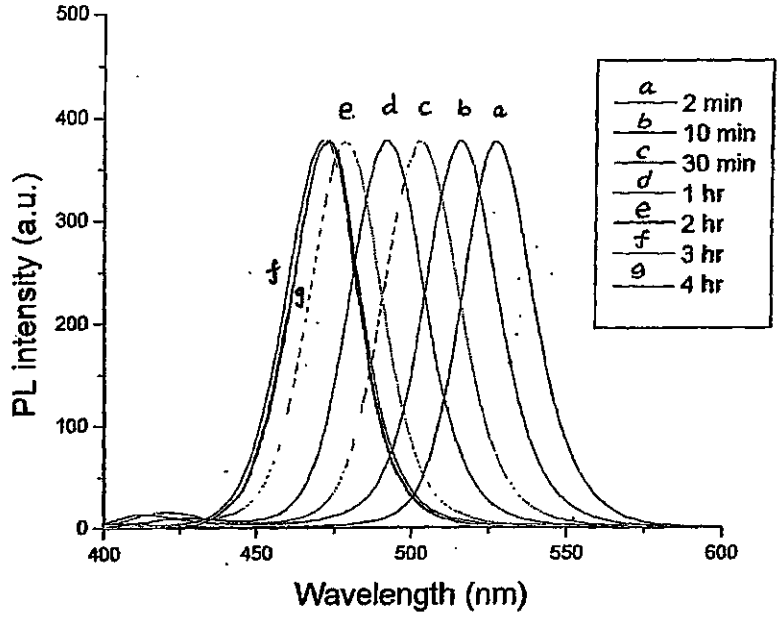

a 2 min
b 10 min
c 30 min
d 1 h
e 2h
PL intensity (a.u.)
400
450
500
550
600
650
700
Wavelength (nm)

(A)

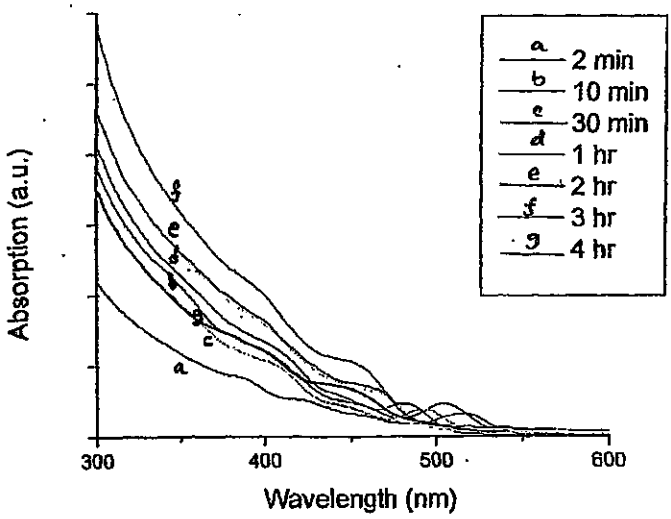

a 2 min
b 10 min
c 30 min
d 1 h
e 2 h
Absorbance (a.u.)
300
400
500
600
700
800
Wavelength (nm)

(B)

Figure 8

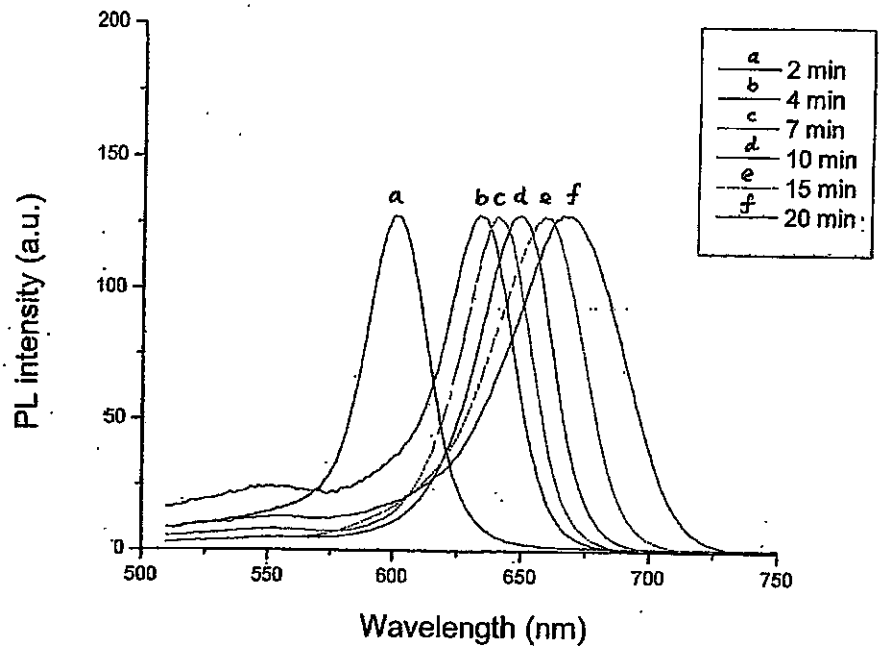

PL intensity (a.u.)
Wavelength (nm)
a 2 min
b 10 min
c 30 min
d 1 hr
e 2 hr
f 3 hr
g 4 hr

(A)

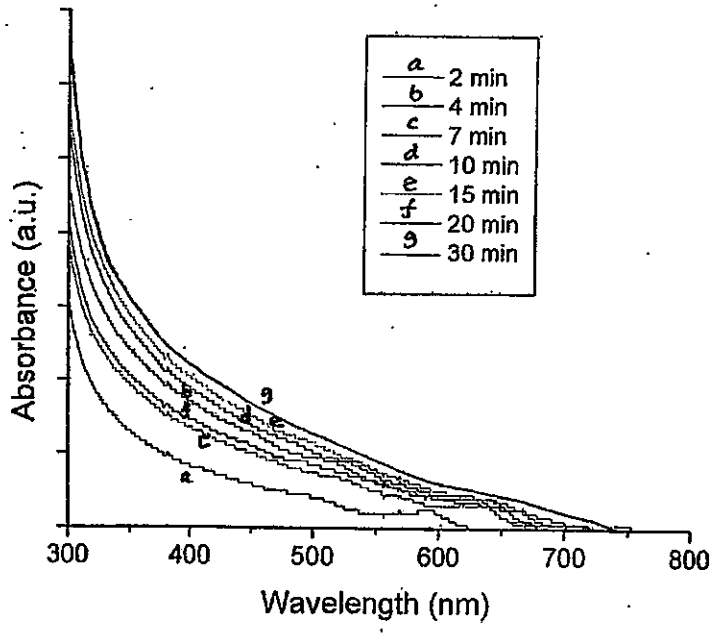

Absorption (a.u.)
Wavelength (nm)
a 2 min
b 10 min
c 30 min
d 1 hr
e 2 hr
f 3 hr
g 4 hr

(B)

Figure 9


PL intensity (a.u.)
Wavelength (nm)
a 2 min
b 4 min
c 7 min
d 10 min
e 15 min
f 20 min
a
b c d e f

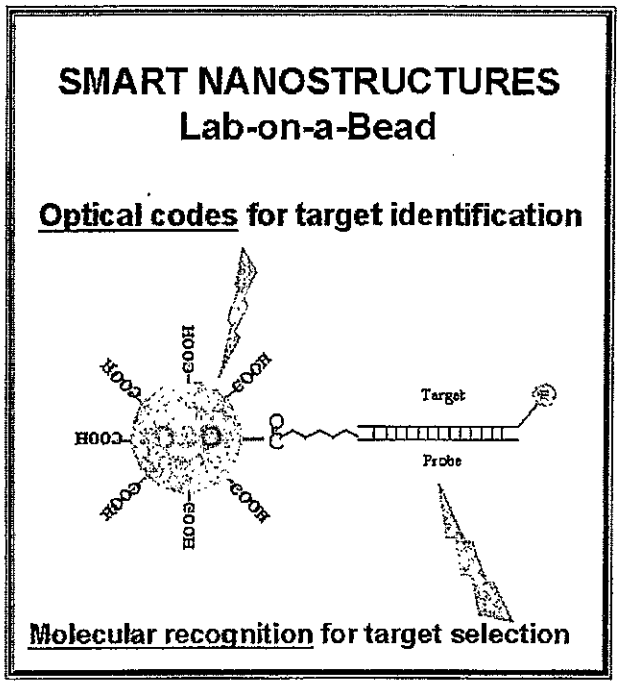
(A)


Absorbance (a.u.)
Wavelength (nm)
a 2 min
b 4 min
c 7 min
d 10 min
e 15 min
f 20 min
g 30 min

(B)

Figure 10

SCHEME II



SCHEME III

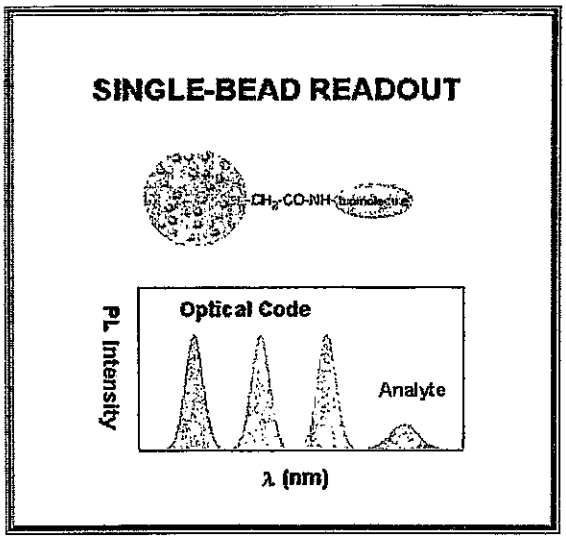
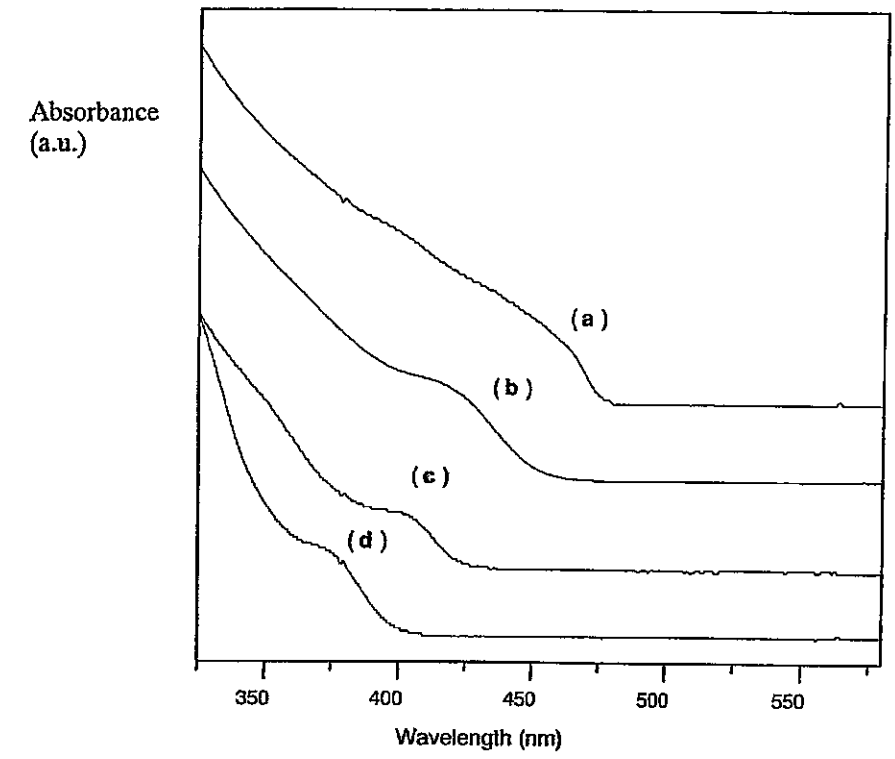
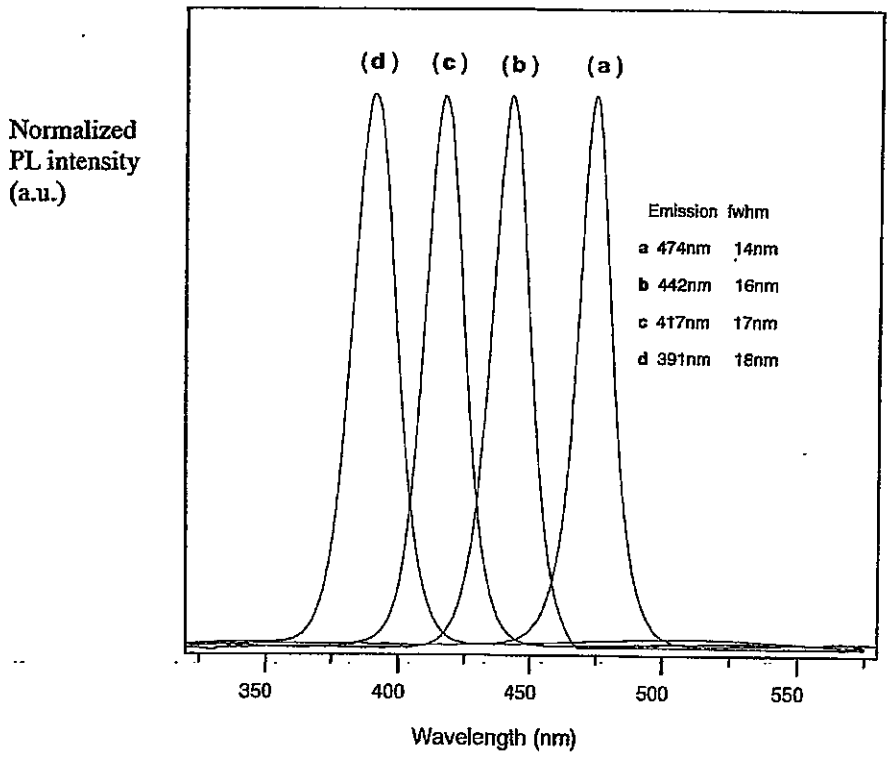


Figure 11


Absorbance
(a.u.)
(a)
(b)
(c)
(d)
350
400
450
500
550
Wavelength (nm)

(A)


Normalized
PL intensity
(a.u.)
(d)
(c)
(b)
(a)
Emission fwhm
a 474nm 14nm
b 442nm 16nm
c 417nm 17nm
d 391nm 18nm
350
400
450
500
550
Wavelength (nm)

(B)

Figure 12

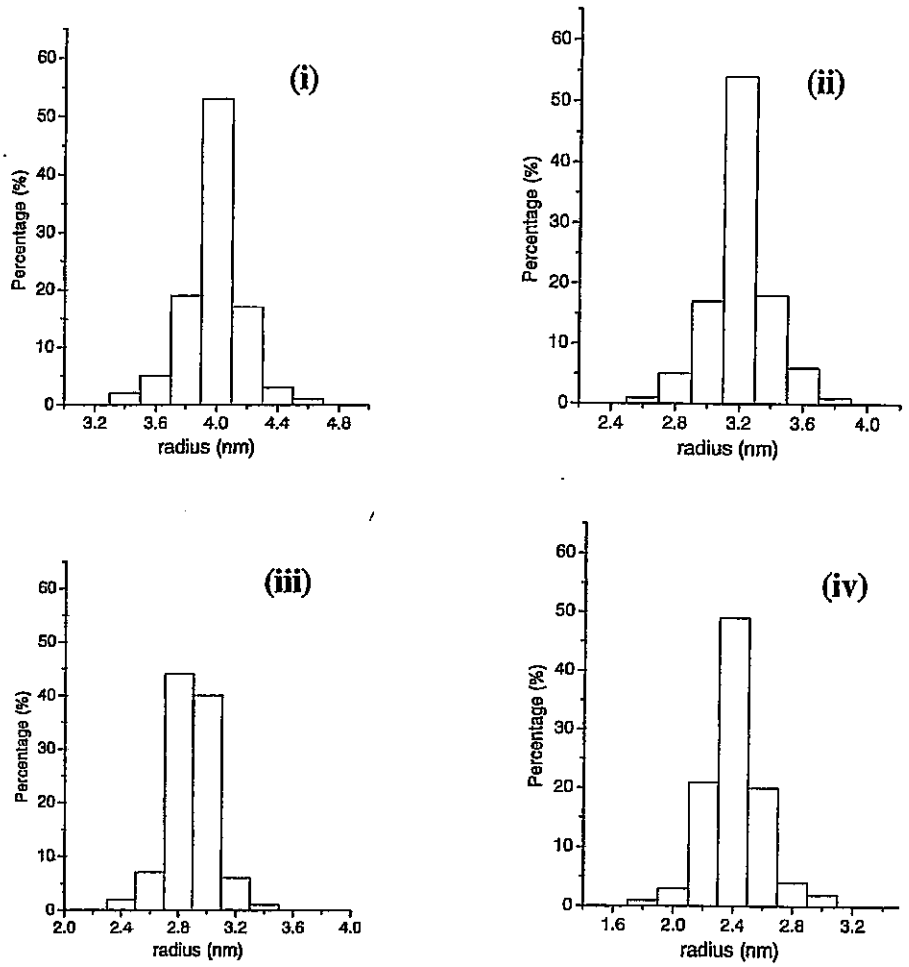

(i)
Percentage (%)
radius (nm)
(ii)
Percentage (%)
radius (nm)
(iii)
Percentage (%)
radius (nm)
(iv)
Percentage (%)
radius (nm)

Figure 12C

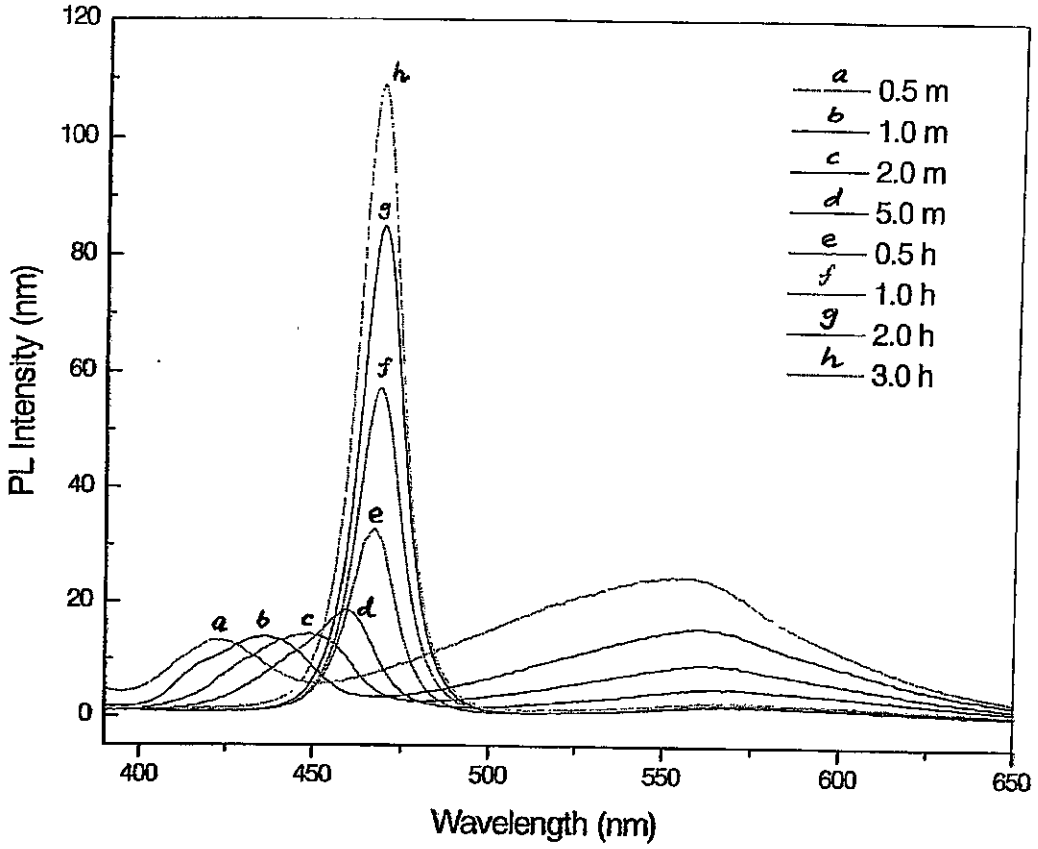
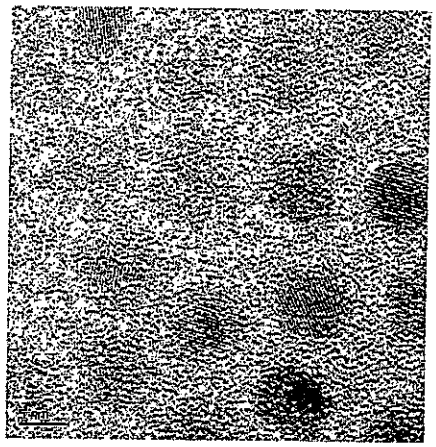
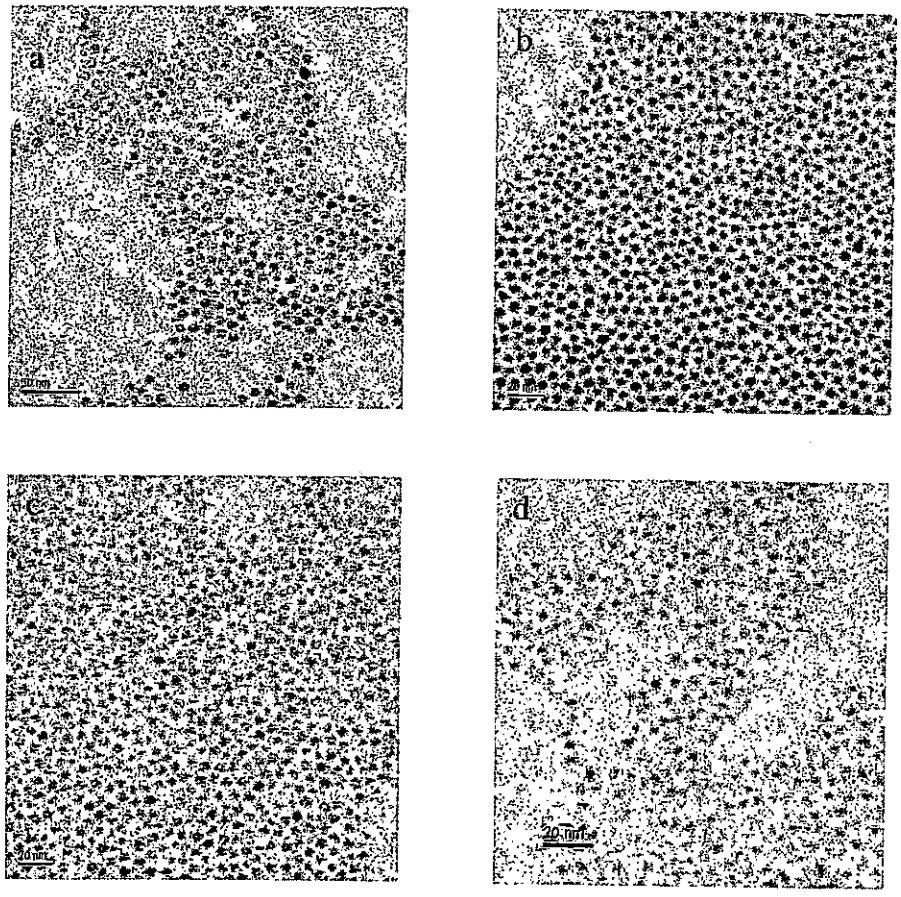

PL Intensity (nm)
Wavelength (nm)
0
20
40
60
80
100
120
400
450
500
550
600
650
a 0.5 m
b 1.0 m
c 2.0 m
d 5.0 m
e 0.5 h
f 1.0 h
g 2.0 h
h 3.0 h

Figure 13



(A)



(B)

Figure 14

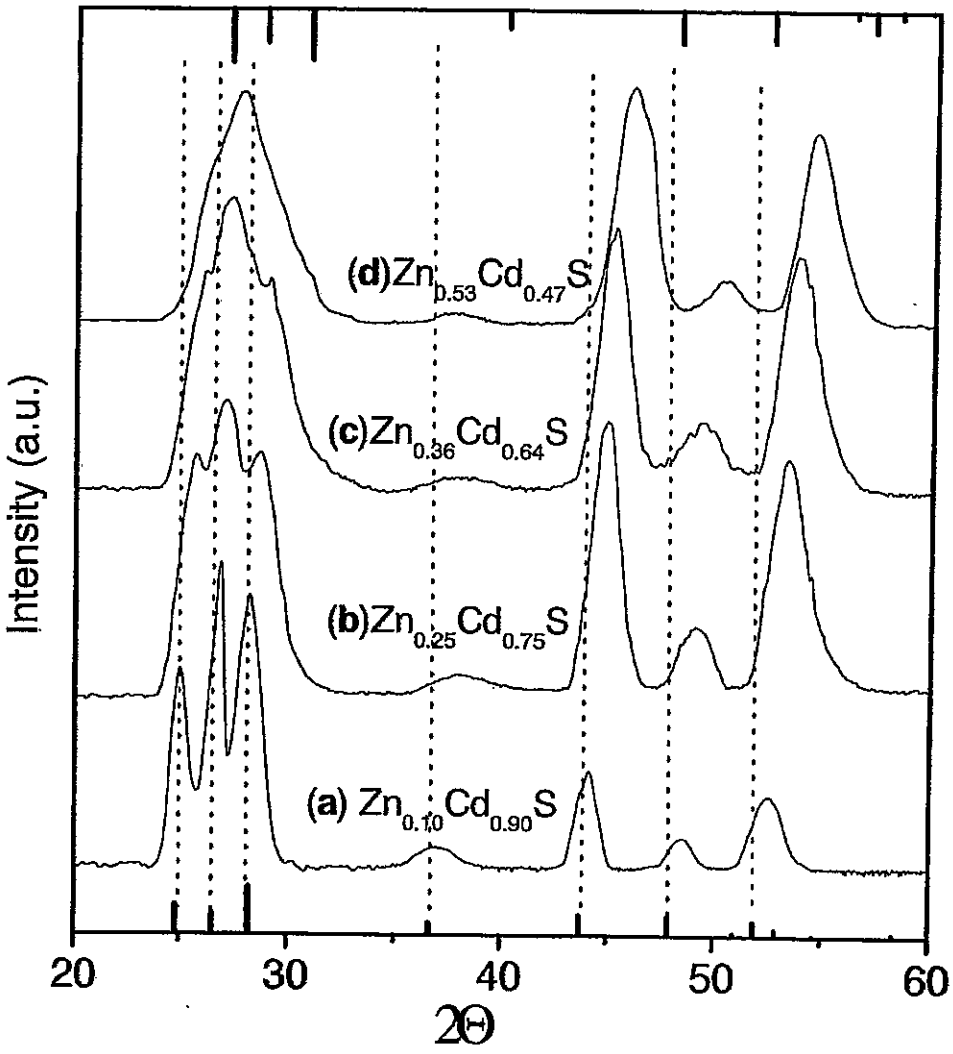

(d)Zn0.53Cd0.47S
(c)Zn0.36Cd0.64S
(b)Zn0.25Cd0.75S
(a) Zn0.10Cd0.90S
Intensity (a.u.)
20
30
40
50
60
2Θ

Figure 15

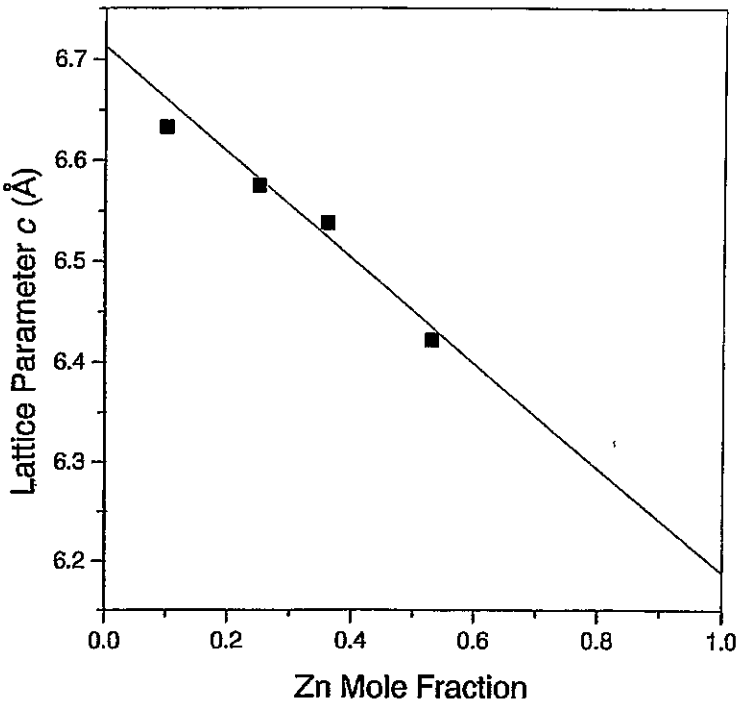


Figure 16

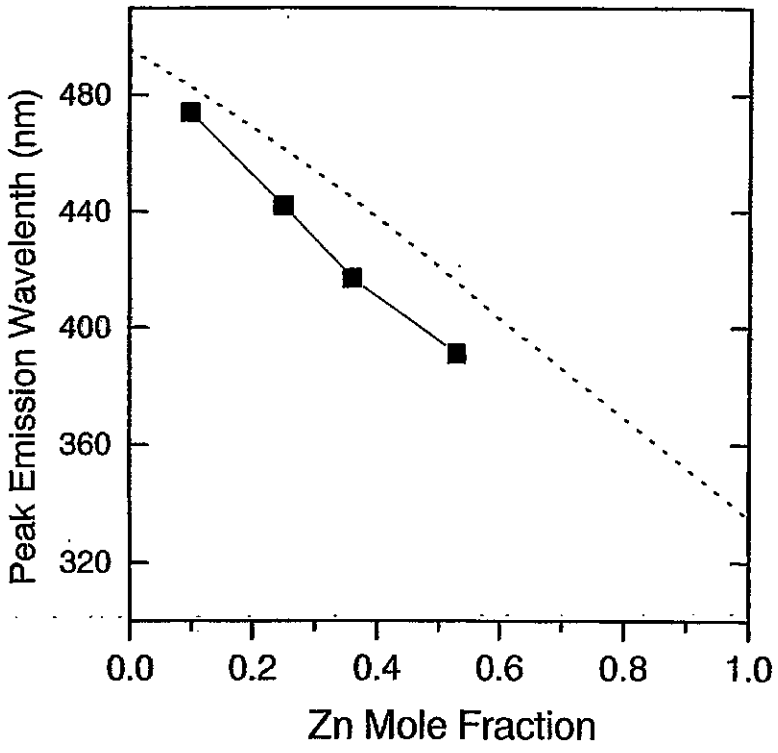


Figure 17